MAG Park-and-Ride Site Selection Study

Design Criteria

Revised Draft Report

Prepared for:
Maricopa Association of Governments
Phoenix, Arizona

May 2, 2000

Prepared by:
INCA Engineers, Inc.
3800 North Central Avenue
Suite 200
Phoenix, AZ 85012

Table of Contents

Table of Contents - Continued

List of Figures

List of Tables

INTRODUCTION

The purpose of this document is to provide information concerning the guidelines and standards used by the RPTA, and other agencies in the design of transit and ridesharing facilities. These guidelines are intended for use by state agencies, public works and planning departments, developers, and interested individuals. The study objective in providing this information is twofold. The primary objective is to encourage the inclusion of transit and ridesharing facilities in the initial design stages of freeway, roadway and new development. A secondary objective is to inform agency staffs how to site and design its facilities.

Rather than presenting detailed engineering specifications for a park-and-ride facility, this document endeavors to provide an overview of the facility, including characteristics, basic dimensions, design criteria, and accepted standards.

The dimensions presented in this document are intended as recommended standards. They may need to be modified in individual cases to meet site constraints or applicable local, state, and federal land use and permit requirements.

The site needs to provide components that are attractive, responsive to the desert, energy efficient, inexpensive to maintain/operate with consideration for security throughout the facility to encourage it's use. These site amenities are presented in a checklist on the following page.

Community involvement is essential in the establishment of the specific site. In many cases there are neighborhood and civic issues that may need to be discussed during the initial stages of design. The surrounding neighbors and businesses will be informed at various stages of the design process by the use of public forums. This information along with established design criteria are the formula for a successful site.

Table 1. Checklist of Park-and-Ride Components

	√	COMPONENT	PAGE REFERENCE
1		Passenger Waiting and Loading Areas	5
2		Passenger/Pedestrian Circulation Areas	10
3		Passenger information	19
4		Climate Mitigation Elements	18
5		Landscape Areas	17
6		Telephones and Drinking Fountains	18
7		Pedestrian Type and Area Lighting	18
8		Signage for Vehicles, Pedestrians, Bicyclists, bus and Rail Passengers, and General Public	20
9		Bicycle Storage and Motorcycle Parking	6
10		Operator Restroom	5
11		ADA Parking	16
12		Rideshare Parking	14

ACCESS/EGRESS

Access points to park-and-ride can be located either on major arterial or secondary streets. The best alternative, which will both intercept automobile traffic and minimize interference to local traffic flow, will be evaluated at each site. Evaluation criteria should include consideration of traffic safety, minimization of traffic congestion, convenience for bus patrons, and impact on local land use.

Locating a facility on the right side for traffic inbound on a two-way arterial will allow most users to make a right turn into the lot, thus eliminating the hazard of crossing an opposing traffic stream. It is likely that maximizing the accessibility for the inbound trips will be more effective in attracting users than improving the flow for the exiting evening traffic.

Entrances and exits should be located, with regard to adjacent intersections, so that signal control of the exit could reasonably installed at a later time if necessary. Storage for vehicles entering from the street and adequate queue storage for exiting vehicles should be planned.

Entrances and exits should be at least 150 feet apart and not closer than 150 feet to a public intersection, all measured curb to curb. However, 350 feet is desirable in both instances. Where the capacity of the parking area does not exceed 150 stalls, the above spacings may be reduced to 100 feet. Whenever a park-and-ride lot has more than 300 parking stalls, at least two entrance drives and two exit drives should be provided. As a guide, the volume per lane should not exceed 300 vehicles per hour. It is desirable for park-and-ride lots with capacities greater than 1,000 parking stalls to have entrance and exit points to two or more adjacent streets in order to allow for uncongested traffic dispersal. The intersection capacities of entrances and exits from the roadway system should be computed for all lots and an adequate level of service provided in the design.[2]

[2] AASHTO, Guide for Design of Park-and-Ride Facilities, 1992

CAPACITY

Park-and-Ride lot capacity is initially determined by analyzing the present and projected population, existing and projected transit ridership and travel characteristics of the area to be served and the use of other park-and-ride lots in the area. Lots usually have 300 to 600 stalls, but exceptions in both directions are possible. Land availability can be a factor affecting the ultimate capacity of any given lot. As a rule of thumb, one acre can accommodate 90 autos in a park-and-ride configuration. Capacity should also be sited in response to customer needs or demands.

PROTOTYPE LAYOUT[1]

The following guidelines for park-and-ride lots are subject to adjustment based on site shape, topography and relationship to adjacent streets.

BUS LAYOVER AREA

The bus layover area should be located on the inbound roadway to the passenger loading area. Storage capacity should be provided according to the service plan developed for the lot. The minimum layover area should be designed to accommodate two articulated buses or three standard 40-foot coaches. Scheduling of timed transfer operations at some lots could increase the space required for bus loading or layover. The layover area can serve buses directly from the street or after unloading the passengers. This concept enables buses to drop off passengers, then circulate back to the layover area, and finally to pick up passengers at the loading area, and finally to pick up passengers at the loading area and proceed out of the lot.

BUS LOADING AREA

The bus loading area should be separated from roadways used by other vehicles. This area is ideally accessed directly from the street and should be consistent with the capacity requirements of the service plan. Future growth and/or expansion of the lot should be taken into account. The minimum space should be able to accommodate one standard and one articulated coach.

DRIVER AMENITIES

Whenever possible, water and sanitary sewers should be brought to the site exclusively for transit operators or on-site security. Where provided, a conventional water closet and lavatory will be installed in an operator restroom located in the bus loading area. A building may also include maintenance space, electrical room or area for security.

PASSENGER WAITING AREA

The passenger waiting area is located between the bus loading area and the vehicle parking area. Pedestrian access should be provided directly from the adjacent street sidewalk, the vehicle parking area, the disabled parking spaces for disabled people, the kiss-and-ride spaces, and the bicycle parking area. A minimum of two passenger shelters should be provided adjacent to each passenger loading area. These shelters should have extended canopies for added protection from the elements in addition to the specific design characteristics.

---

[1] Municipality of Metropolitan Seattle (Metro), Seattle, Washington Metro Transportation Facility Design Guidelines, March 1991

PARKING FOR PEOPLE WITH DISABILITIES

Parking for people with disabilities should be closest to the passenger loading area. The specific number of spaces is addressed in each of the respective city's zoning codes.

KISS-AND-RIDE PARKING

Parking for motorists waiting to pick up a passenger from the bus or rideshare vehicle should be provided at the passenger waiting area on either side of the shelter. Motorists can drop passengers off in the circulation aisle adjacent to the passenger waiting area. Kiss-and-Ride parking should not mix with the flow of buses.

The vanpool kiss-and-ride or staging area should be located adjacent to the transit vehicle loading area out of the way of bus passengers and easily accessible by HOV lane.

CYCLE PARKING

Bicycle and motorcycle parking should be provided adjacent to the passenger waiting area and the adjacent street. This provides bicyclists with direct access from the street and motorcyclists with direct access from the parking area. Bicycle rack and lockers should be provided along with motorcycle security. Motorcycle stalls should measure 3 feet in width and 8 feet in length. Ample lighting and barriers should be provided to ensure that cycle parking does not pose a hazard to pedestrians.

VEHICLE PARKING

Park-and-Ride parking aisles should be perpendicular to the passenger waiting area. It is recommended that parking spaces be at 90-degree angles and served by two-way aisles no more than 400 feet long. Bus patrons would have a maximum walk of 300 feet. This parking layout allows vehicles to circulate in the parking area away from the passenger waiting area. Motorists would approach a parking space generally driving towards the waiting area, park, and then continue walking in that direction to the passenger waiting area. The reverse movement would occur for people leaving the buses. This circulation pattern minimizes conflicts between pedestrians and motorists.

GENERAL VEHICLE ACCESS

Vehicles may access the parking area by at least one two-way driveway located away from the passenger waiting area. Vehicles can circulate within the lot away from the pedestrians, thereby minimizing conflicts between vehicles and pedestrians.

A sufficient number of entrances and exists should be provided so that the volume per lane does not exceed 250 vehicles per hour where sufficient street frontage exists. The number of entrances and exist should match circulation requirements. Wherever a park-and-ride lot has more than 300 parking stalls, at least two exits should be provided.

HOV ACCESS

HOV access to park-and-ride lots should be developed to give equal priority to both transit and vanpool vehicles. If the lot has a flyer stop, the vanpool may enter on the HOV lane. A queue-jump HOV lane should be considered for egress from large lots. Entrance and exit roadways for HOVs should be located at least 150 feet from other intersections. The need for present or future signalization may increase this distance consistent with traffic engineering warrants of the local jurisdiction.

FREEWAY RAMP ACCESS

Access to the park-and-ride facility should not increase congestion on the arterial highway or freeway, which it serves. For this reason, direct access by private automobiles to a freeway ramp will not typically be considered. However, direct access for buses is often desirable. The access location must be carefully considered. It should be located to avoid queues from nearby intersections or freeway interchanges. Field observance of traffic patterns and queuing at the site are recommended prior to establishing an access point. Close coordination and concurrence is required with the ADOT Traffic Section and Phoenix District.

FUTURE CONDITIONS

It should be noted that some of the sites in the future might also be providing service for Light Rail. If there is that possibility it should be noted that the Standards for Light Rail may differ from dimensions provided in this design criteria.

Figure 1. Prototype Park-and-Ride Lot

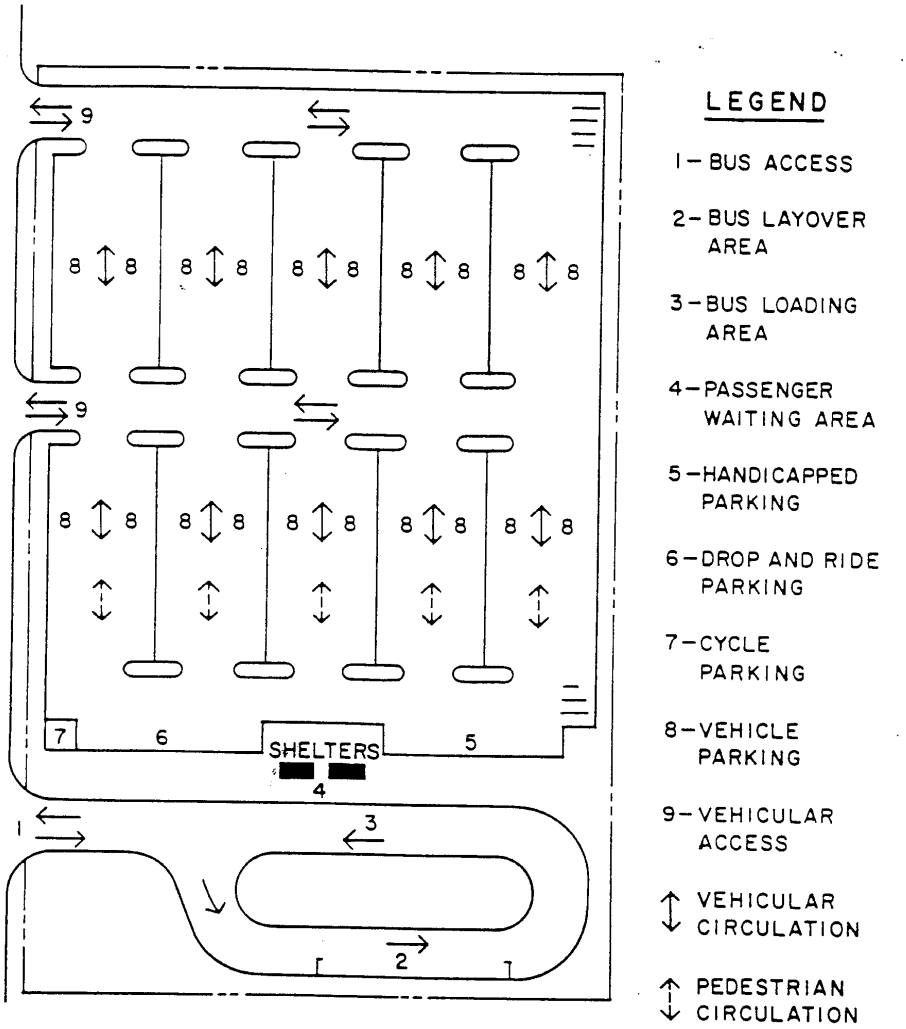
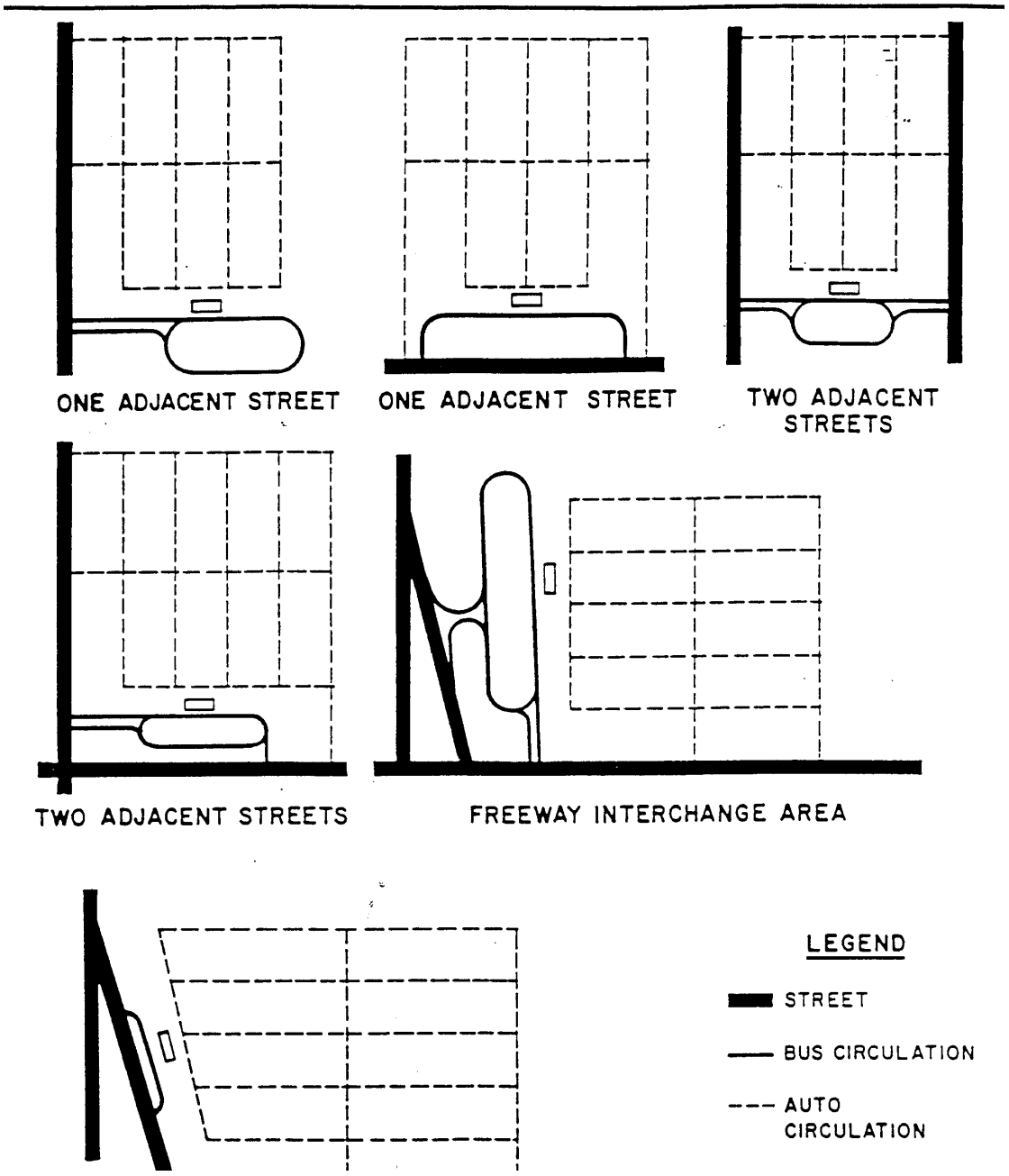


Figure 2. Application of Prototype to Varying Site Conditions



INTERNAL CIRCULATION

GENERAL GUIDELINES

- The distance from facility access points should be adequate to provide for maneuvering and to minimize conflicts.[2]
- Access points should be located to minimize conflicts near the passenger shelter and waiting area.
- The arrangement of parking aisles and stalls should minimize vehicle travel distances, conflicting movements, and number of turns.
- Separation should be maintained between vehicle and pedestrian traffic.
- Circulation patterns should be simple and direct, allowing for easy driver orientation.
- Circulation patterns for arriving vehicles are more critical than for departing vehicles. Arriving vehicles are meeting scheduled bus departures.
- If anticipated bicycle usage is substantial bicycle racks and bicycle lockers should be provided. Bicycle parking should be located relatively close to the transit loading area if possible.
- Flexibility to adjust changes in transit volume and operations should be provided.

BUS CIRCULATION

- Unless a significant number of riders can be picked up at the park-and-ride lot, an operator will not want to divert the bus into and out of the lot.
- Bus travel time within the lot should not exceed two minutes and the bus circulation path should be as direct and short as possible. Bus turnouts immediately adjacent to public roads may be used as loading area.
- Parallel type bus stops or sawtooth bus bays should be used in park-and-ride lots. Bus stops on adjacent public streets should use the "bus bay" designs to the standards of the agency having jurisdiction.
- Standard bus operations criteria are a major consideration in the design of the park-and-ride facility;[3]
    - Bus roadway width: (9' Bus bay, 11' Travel Lane) Typical
        - for one-way traffic: 29 feet (9'-11'-9')
        - for two-way traffic:
            - bay one side: 31 feet (11'-11'-9')
            - bay both sides: 40 feet (9'-11'-11'-9')
    - Buses per hour per bus berth: 2-10 buses

---

[2] AASHTO, Guide for Design of Park-and-Ride Facilities, 1992

[3] Regional Public Transportation Authority (Valley metro), Phoenix, Arizona, Passenger Facilities Handbook, June 1995

- Sawtooth berth design
  - length of space for standard bus: 60-65 feet
  - length of space for articulated bus: 80-85 feet
  - recessed area from curb line: 7-10 feet
- Parallel berth design
  - length of space for standard bus: 80 feet
  - length of space for articulated bus: 100 feet

♦ Pedestrian entrance and exit points should be within the bus driver's field of visions.

KISS-AND-RIDE CIRCULATION

Approximately 10 percent of the total number of vehicles using a park-and-ride lot could be kiss-and-ride vehicles. The average waiting period in the evening for a kiss-and-ride for a kiss-and-ride vehicle is 6 to 10 minutes. Space for kiss-and-ride vehicles should be provided for approximately 1 to 1.5 percent of the lot's capacity.

VANPOOL CIRCULATION

A separate staging area/loading area/kiss-and-ride area needs to be developed for vanpools adjacent to the transit vehicle loading area.

PARKING DIMENSIONS AND LAYOUT[2]

Basically, the parking site should offer safe, rapid parking and related movements for all users.

Parking areas for long-term parkers (park-and-ride) can be designed in much the same manner as other parking facilities. Recommended dimensions for parking stalls of standard, intermediate and compact sizing are provided in Table 1. A reasonable number of short-term (kiss-and-ride) spaces, generally wider will also be provided when required. Turnover in these spaces will be very high, but they are particularly needed for parking vehicles waiting to pick up passengers disembarking from line haul transit vehicles.

[1] Municipality of Metropolitan Seattle (Metro), Seattle, Washington Metro Transportation Facility Design Guidelines, March 1991

[2] AASHTO, Guide for Design of Park-and-Ride Facilities, 1992

Table 2. Typical Parking Dimensions

Size	Width (ft)	Length (ft)	Aisle Width (ft)
Standard	8.5-9.5	18-20	24-26
Intermediate	8.0-9.0	16-18	22-24
Compact	7.5-8.5	15-17	20-22

Source: Guide for Design of Park-and-Ride facilities, AASHTO

There is normally a greater need for kiss-and-ride functions in remote lots, but space provisions should be made in both remote and peripheral lots. Adequate room should be available to permit the segregation of park-and-ride and kiss-and-ride functions. Separate lanes, near the point where the transit vehicle is boarded, should be provided solely for discharging and picking up kiss-and-ride patrons, this procedure avoids unnecessary congestion at the lot entrance due to kiss-and-ride queues.

Care should be taken in the design of parking lot layouts for park-and-ride to provide for a mix of patrons' vehicle sizes.

Substandard stall and aisle widths can be a false economy. Although they permit the marking of more stalls per given area, vehicles tend to encroach upon adjacent stalls so that one or more spaces are unavailable for use. The end result is no gain in actual space usage and a parking condition plagued by confusion.

In dividing the lot into appropriate general parking areas, it is suggested that only two size stalls be considered – standard and intermediate. It is believed that if all three sizes were used (i.e., standard, intermediate and compact), it would be difficult to sign directions and would be confusing for auto drivers to self-sort their automobiles into one of three classifications. With just two stall sizes available – standard and intermediate – and especially if there are sufficient numbers of standard stalls to allow for some incorrect classifications, driver recognition and utilization will be easier.

Stalls for the handicapped and elderly should be located in close proximity to the transit vehicle loading and unloading area.

STALLS AND AISLES

Aisle width is a function of the parking angle and stall width. One-way aisles are generally used with angle parking and two-way circulation is generally used with 90-degree parking.

Stall and aisle dimensions for all day parking should preferably conform to the 9 feet X 18.5 feet standard. However, an 8.5 feet x 18 feet, 90 degree standard or 8 feet X 16 feet or a 7.5 feet x 15 feet, 90 degree standard can be used for intermediate or compact cars. Another available option is the angle parking interlocking module. The most common interlocking module is the one that places the bumpers of vehicles in adjacent stalls next to one another. At varying degrees, nested interlock is possible when adjacent aisles have one-way movement in the same direction. All parking should be head-in only. Aisle lengths should not exceed 400 feet if possible. One-way aisles should favor counterclockwise circulation. Where stalls are located adjacent to a curb and sufficient width is available behind the curb,

the stall depth can be reduced by 2 feet. When this configuration is considered, a 2 foot paved platform should be included to simplify maintenance (e.g., grass mowing). Due to lower vehicle undercarriage height, a 6-inch curb is recommended where head-in curbed parking is being considered.

The grades on the park-and-ride lot parking areas should be set so that drainage can be effective. Recommended grades are 1- percent minimum, 2 percent desirable with a maximum of 5 percent. Excessive grades of over 8 percent, parallel to the length of the auto, should be avoided. If this is not possible, rotate the parking layout up to 90 degrees to the excessive grade or use curbs or bumpers (wheel stops).

Vehicles and other objects should be excluded from corners or parking spots where it is necessary to provide adequate intersection sight distances. Islands at the end of rows should be considered in the layout of the lot. The islands can be raised (curbed) to provide clear definition to the row or to provide a landscaping area, or painted to maximize the use of the available property. Painted islands should be no wider than 4 feet to reduce the potential for patrons to illegally use the area as a parking stall.

In the actual layout of parking stalls and circulation aisles, it is desirable to align the aisles parallel to the direction of pedestrian flow in the interest of safety. It is also desirable to have a row of parking on each side of the aisle. This provides the most efficient design in terms of land area use. In addition, the greatest efficiency can generally be obtained by placing aisles and rows of parking parallel to the long dimension of the site.

SPECIAL PARKING NEEDS

PARKING FOR PEOPLE WITH DISABILITIES

Parking spaces for patrons with disabilities should be located near the bus-loading zone. The vanpool staging area will also require such parking. The following guidelines should be used in locating these spaces:

- A patron with a disability should not have to cross an access road enroute to the bus-loading zone or vanpool staging area, nor should the person have to travel behind parked cars.
- Each parking stall should be 13 feet wide. Alternatively, stalls could be 8 feet wide with a 5-foot common walkway between them.
- Appropriate signing or pavement markings should indicate the restricted use of the space for persons with disabilities. Curbs to and from the bus loading area should be depressed for wheelchair users or have ramps.
- Local jurisdictions may also have their own standards for design of parking spaces for disabled people.

RIDESHARE VEHICLE PARKING

Remote/outer edge parking (away form the bus/vanpool loading zones) for car-poolers within a park-and-ride lot may be developed through site design. Elements such as access to/from the lot, security, etc. need to be considered to promote voluntary use of remote parking areas.

PEDESTRIAN FACILITIES

SIDEWALKS

A route of travel accessible to wheelchair users should be provided through all park-and-ride lots. Pedestrian facilities must provide a means of safe access to bus loading zones and vanpool staging areas. A sidewalk should be located next to all curbside-parking lanes and to all loading zones.

Sidewalks should be a minimum of 5 feet wide for two-way pedestrian traffic. Parking areas should be designed so that vehicles do not overhang the sidewalk. Sidewalk design should be compatible with existing sidewalks in the area. Where sidewalks abut public roadways, the width should be in accordance with the local design standard. The minimum width of sidewalk adjacent to a bus or taxi loading zone should be unobstructed with space should be 8 feet from the curb.

PAVING MATERIALS

Paving materials in pedestrian areas should provide good traction to reduce the risks of falling slipping.

BRIDGES AND TUNNELS

Construction of pedestrian bridges and tunnels should be avoided if another acceptable alternate design is feasible. Where tunnels are built, they should have a generous cross-section and be well lighted. Tunnels should be placed so that continuous visibility is provided into the tunnel when viewed from the approaches; maximum consideration should be given to the safety of patrons and disabled users.

WALKING DISTANCE

The distance a pedestrian should have to walk form the car to the bus load zone should be a maximum of 300 feet or approximately one minute walk is optimal.[4]

PEDESTRIAN CROSSINGS

Pedestrian crosswalk markings should be placed to represent an extension of sidewalks and provide acceptable line-of-sight distances for pedestrian safety (refer to local jurisdiction standards). Cross walk lines should ideally be located at intersections. Crosswalk lines should be used when sidewalks are present and if any of the following conditions exist:

---

[4] Transit Facility Design Guidelines, Regional Transportation District (RTD) Denver, Colorado, September 1987

- At signalized intersections across all approaches.
- At stop-controlled intersections across the controlled approaches.
- At any intersection across those approaches with a pedestrian volume exceeding 50 pedestrians in any hour.
- At any location where it is desired to encourage pedestrian travel.
- At any location where pedestrians could not otherwise recognize the intended place to cross a roadway.

ADA ACCESSIBILITY

Transit centers, like all other public facilities, are required to comply with the Americans with Disabilities Act (ADA) to ensure access to all persons. Some of the key elements of ADA and accessibility issues specific to transit include the following;

1. Minimum walkway width of 48 inches must be provided at all times.
2. Optimum walkway width of 8 feet allows circulation with space for wheelchairs to pass.
3. Maximum gradient on any ramp shall not exceed 8.33 percent.
4. Entrances and exits to structures should be flush.
5. An accessible pathway for persons with disabilities should be provided throughout the facility.

SHELTERS

Shelters provide pedestrian users with comfort and protection from the weather. Shelters should be considered in areas where the magnitude of transit service and variation in environmental conditions warrant the expenditure of funds.

LANDSCAPING[3]

Landscaping for any park-and-ride facility serves a number of purposes. It not only adds to the aesthetic quality of the project, but it also serves to mitigate climatological factors. Landscaping can also help create the project's unique identity and serve to screen the project from adjacent uses. Landscaping should be designed in such a manner so that hiding places for persons engaged in criminal activity will be minimized. Use of low ground covers and trees with high canopies balance visibility, security, site design and buffering. Landscaping can provide an effective means for establishing pedestrian paths and walking patterns within the site.

1. Plant materials should complement the design and character of the surrounding community.
2. Native species, which are drought resistant and require low maintenance, should be used to the maximum extent possible.
3. Shade provided by trees allows opportunity for solar protection without a closed interior environment. Upon maturity, trees can lower temperatures at least 10 degrees.
4. Trees also provide climate enhancement in an arid region by shading pavement and reducing heat gain as well as the carbon content of the air.
5. Shade trees are an important landscape element due to the fact that they provide canopy protection without obstructing visibility.
6. Low shrubs and ground covers may be used in moderation as long as they do not obstruct visibility through the site.
7. Properly selected plant materials may require less maintenance than structures.
8. For trees in an urban paved environment, the minimum soil dimensions are 10 feet by 10 feet. This is required to maintain a greater survival rate and ensure that trees reach full maturity.

[3] Regional Public Transportation Authority (Valley Metro), Phoenix, Arizona, Passenger Facilities handbook, June 1995

SECURITY AND COMFORT OF PASSENGERS[3]

A major goal in the design of a park-and-ride facility is providing for the security and comfort of passengers. A secure environment provides a heightened sense of comfort for passengers and adds to their willingness to use a facility. The following objectives should be maintained during the design process to ensure that a proper level of security is provided within the design:

- Adequate lighting is important from a safety standpoint and serves as a deterrent to vandalism in both the parking area and the shelters. The normal lighting levels should range from one to two foot-candles (fc) average maintained with a uniformity ratio (average illumination divided by minimum illumination) of not more than 4:1. The following are recommended foot-candle levels per area type: Interior Roadways = 0.6, Parking Area = 1.0, and Loading Platforms, Open = 5.0. All lighting should be constructed of durable, vandal resistant materials.
- Clear visibility through the site for purposes of police surveillance should be maintained to the extent possible.
- Corners and edges of walls and structures should be rounded to minimize blind spots.
- Public telephones should be provided for use by facility patrons.
- Allow setback for waiting passengers from bus berth curb of 8 feet minimum to maintain adequate distance from moving traffic.
- Shading and waterproof weather protection should be provided.
- Both exterior and interior seating should be provided for maximum comfort and should be constructed of durable, vandal resistant materials. Where seating is included, extend setback wherever possible.
- Drinking fountains are high concerns for passengers.
- Restrooms are desirable for passengers but need to be a policy decision of the local agency responsible for implementing the project.
- Telephones should be placed under a weatherproof cover a minimum of 20 feet from bus traffic or should be enclosed with acoustic protection sufficient for passengers to hear.
- Trash receptacles should be conveniently located to passenger boarding and waiting areas and should be constructed of durable, vandal resistant materials.

[3] Regional Public Transportation Authority (Valley Metro), Phoenix, Arizona, Passenger Facilities Handbook, June 1995

- Bicycle racks and lockers are also needed for multi-modal users of the facility.
- Canopies for vehicles. The addition of this item may entice users to the lot but need to be a policy decision of the local agency responsible for implementing the project.
- Information kiosks.
- Potential links to ADOT freeway cameras and fiber optic links for passenger information.
- Use of the city of Phoenix Crime Prevention Through Environmental Design (CPTED) Standards.

SIGNAGE[3]

The ability of passengers to locate and use a park-and-ride facility is based in part on the signage directing them to the facility, identifying the facility and identifying elements within the facility. The following recommendations are intended to help provide proper signage for the benefit of facility patrons.

- Trailblazing signs should be provided to guide patrons to the facility from neighboring streets and activity centers.
- Signage identifying the site, such as monument signs, should be consistent with the operators' regional identity and the design character and quality of the facility itself.
- Signs identifying bus routes served and berths should be consistent with the regional standards, as they are familiar to passengers.

[3] Regional Public Transportation Authority (Valley Metro), Phoenix, Arizona, Passenger Facilities Handbook, June 1995

CODE REQUIREMENTS[3]

The design of transit centers must comply with all rules, regulations, codes and ordinances set forth by the appropriate governing local, State and Federal agencies. Examples of the codes, which may affect the design of a transit center, include the following:

- The Uniform Building Code (UBC).
- The National Fire Protection Association Code (NFPA).
- The MAG Uniform Standard Specifications for Public Works Construction.
- The MAG Standard Details.
- The City Supplements to the MAG Standard Details and Specifications.
- The Arizona Department of Water Resources Low-Water Use Plant List.
- The Americans with Disabilities Act of 1990 (ADA).
- The ADOT Construction Standard Drawings (31-001).
- The ADOT Structures Section Standard Drawings (31-002).
- The ADOT Traffic Signals and Lighting Standard Drawings (33-001).
- The ADOT Signing and Marking Standard Drawings (33-002).
- The ADOT Standards for Right-of-Way Plans.
- The ADOT Standard Specifications for Road and Bridge Construction (31-066)

[3] Regional Public Transportation Authority (Valley Metro), Phoenix, Arizona, Passenger Facilities Handbook, June 1995

ZONING REQUIREMENTS[3]

One of the regulatory requirements varying from one city to the next will be that of zoning. It is important to make sure that the design of a park-and-ride facility is consistent with the zoning requirements. Applicable zoning requirements, which are apt to affect the design of a park-and-ride facility in any community, include the following:

- Height of any structure above grade.
- Setbacks, front, side and rear.
- Landscape requirements within the required yard areas.
- Buffering as required will screen the facility from adjacent uses.

[3] Regional Public Transportation Authority (Valley Metro), Phoenix, Arizona, Passenger Facilities Handbook, June 1995

JOINT DEVELOPMENT/USE

In addition to simply providing facilities to directly support transit operations, there is a wide array of joint development/use opportunities which may provide some benefit to the overall regional transit system by increasing system safety, convenience and visibility. With these facilities the agencies need to consider cost benefit ratios and may require long term commitments to be feasible.

JOINT DEVELOPMENT

Joint development is any non-agency development that is permanently and physically attached to a facility property in accordance with negotiated agreements between the agency and other entities. In joint development ventures the agency primarily considers cost benefit ratios. Joint development should contribute to increase ridership, maximize social and economic benefits, and generate revenue for use in maintenance of transit service.

Joint development is an economical way to construct and maintain park-n-rides, and provide benefits to the agency as well as a development partner. Activity areas including office and retail centers may be appropriate locations for park-n-rides that are jointly developed.

Joint development will utilize the design standards for exclusive park-and-ride facilities.

JOINT USE

A joint use facility is defined as a parking lot used for a specific activity but also used to accommodate commuter vehicles from the beginning of the morning commute until the end of the evening commute.

Joint use park-n-rides are normally existing facilities. The agency arranges for the use of a portion of the parking area and may make minor modifications for transit patrons.

Good examples of parking facilities that have had a tradition of joint use can be found at some of the professional sport centers, drive-in theaters, recreational centers, shopping centers, and churches. Factors such as size, delineation, bus accommodation, and amenities should be considered before they are used for park-and-ride operation.

Lot Size

A parking lot should be large enough for its immediate expected use and for its possible expansion. The size of the lot that is required will depend on the type ridesharing or public transit service to be provided. For instance, an express bus from a remote lot (10-20 miles from the destination) would attract more riders and need to use the lot at a shopping center or sports arena. Lots nearer the destination (4-10 miles) usually generate fewer patrons and can utilize churches or neighborhood shopping centers.

Delineation

The part of the lot designated for park-and-ride use should be well marked to prevent interference with other traffic in the lot and make it easier for the commuter to use. There should be bus logos and directional and informational signs as well as painted parking stalls and crosswalks. The terminal area should be clearly designated for improved safety for pedestrians and mobility of buses.

Bus Accommodation

Joint use parking lots were not designed for transit vehicles. Alterations may be required at the entrances and exits of the lot to accommodate the wider turning radii and allowable grades for these vehicles. As with the exclusive park-and-ride lot, the loading area and roadways will be used by the buses should be constructed with reinforced concrete. Without this, the heavier buses could deteriorate the parking lot. A way to avoid altering the lot might be to provide a loading zone for buses directly off the street. This would allow the lot to be used by park-and-ride automobiles without requiring buses to access the facility.

Amenities

The need for amenities at a joint use lot is not as great as dedicated facilities. The additional expenditures are usually not warranted when a facility serves too few people, or phones and other amenities are readily available at nearby activity areas. Generally, the amenities for the joint use lot should include a bus shelter with benches, an information board that indicates the schedules, and newspaper vending machines. There is less need for additional security measures since the park-and-ride operation would most likely share a lot that already has some form of security.